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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/925,356	08/09/2001	Huang-Chung Cheng	DEE-PT028	4334

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EXAMINER	
NINO, ADOLFO	

ART UNIT	PAPER NUMBER
2831	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/925,356	CHENG ET AL.
	Examiner	Art Unit
	Adolfo Nino	2831

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 August 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Specification

The disclosure is objected to because of the following informalities:

Page 7, line 7, "by" should be ---be---.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 2 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhang (US 6,165,808).

Regarding claim 1, Zhang discloses a process of forming a field emission electrode for manufacturing a field emission array (col. 1, lines 15-21), comprising steps

col. 5, lines 40-42) thereon; (b) forming a plurality of mask units (22) on said metal layer and partially removing said metal layer uncovered by said mask units (fig. 4b); (c) oxidizing a surface of the remained metal layer by an anodic oxidization method (col. 6, lines 53-57) for forming a metal oxide layer (31) thereon such that an upper portion of

the unoxidized remained metal layer is in the shape of plural conoids (fig. 4c); and (d) removing said remained mask units and said metal oxide layer (fig. 4f).

Regarding claim 2, Zhang discloses the process according to claim 1, wherein said substrate is made of a material selected from a group consisting of plastic, quartz and glass (col. 6, line 48).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang (6,165,808) in view of Cheng et al (US 5,770,514).

Regarding claim 3, Zhang discloses the process according to claim 1 above, **except for** explicitly stating that said metal layer (col. 5, line 40) is selected from a group consisting of aluminum layer, tungsten layer, tantalum layer, molybdenum layer, molybdenum-tungsten alloy layer and molybdenum-tantalum alloy layer. Cheng et al. teach that it is known to have had selected said metal layer from a group consisting of aluminum layer, tungsten layer, tantalum layer, molybdenum layer, molybdenum-tungsten alloy layer and molybdenum-tantalum alloy layer as set forth at column 4, lines 6-10. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have had selected said metal layer from said group, as taught by Cheng et al. since this group of metals are known in the art.

Regarding claim 4, the modified Zhang discloses the process according to claim 3, wherein said metal layer (col. 5, line 40) is formed on said substrate by a method selected from a group consisting of electron gun evaporation, sputtering technique and heat coating technique (Cheng et al. at col. 3, lines 38-50).

Regarding claim 5, Zhang discloses the process according to claim 1, **except for** said step (b) being performed by a photolithography technique and an etching method.

units by a photolithography technique and an etching method as set forth at column 3, lines 32-33. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have had performed the step of forming a plurality of mask units by a photolithography technique and an etching method, as taught by Cheng et al. since this step is well known in the art of masking.

Regarding claim 6, the modified Zhang discloses the process according to claim 5, wherein said etching method is selected from reactive ion etching method and wet etching method (Zhang at col. 7, line 17).

Regarding claim 7, Zhang discloses a process of forming a field emission electrode for manufacturing a field emission array (col. 1, lines 15-21), comprising steps of: (a) providing a substrate (20 in figs. 4a-f) having a metal layer (col. 3, lines 14-17; col. 5, lines 40-42) thereon; (b) forming a photoresist layer (22) on said metal layer; (c) partially removing said metal layer uncovered by the remained photoresist layer; (d) oxidizing a surface of the remained metal layer by an anodic oxidization method for forming a metal oxide layer thereon such that an upper portion of the unoxidized remained metal layer is in the shape of plural conoids; and (e) removing said remained photoresist layer and said metal oxide layer, **but Zhang does not disclose** removing a portion of said photoresist layer (22) by a photolithography technique. Cheng et al. teach that it is known to perform the step of forming a plurality of mask units by a photolithography technique and an etching method as set forth at column 3, lines 32-33. It would have been obvious to one having ordinary skill in the art at the time the

photoresist layer by a photolithography technique, as taught by Cheng et al. since this step is well known in the art of masking.

Regarding claim 8, the modified Zhang discloses the process according to claim 7, wherein said metal layer (col. 3, lines 14-17; col. 5, lines 40-42 of Zhang) is selected from a group consisting of aluminum layer, tungsten layer, tantalum layer, molybdenum

layer, molybdenum-tungsten alloy layer and molybdenum-tantalum alloy layer (col. 4, lines 6-10 of Cheng et al.).

Regarding claim 9, Zhang discloses a process of forming a field emission electrode for manufacturing a field emission array (col. 1, lines 15-21), comprising steps of: (a) providing a substrate (20 in figs. 4a-f) having a first metal layer (col. 3, lines 14-17; col. 5, lines 40-42) thereon; (b) forming a plurality of mask units (22) on said first metal layer and partially removing said first metal layer uncovered by said mask units (fig. 4b); (c) oxidizing a surface of the remained first metal layer by an anodic oxidization method (col. 6, lines 53-57) for forming a metal oxide layer (31 in fig. 4d; col. 7, line 42) thereon such that an upper portion of the unoxidized remained first metal layer is in the shape of plural cylinders (figs. 4b, c); **but Zhang does not disclose** the following steps: (d) forming a second metal layer on said metal oxide layer; and (e) removing said remained mask units. Cheng et al. teach that it is known in the art to form a second metal layer on a metal oxide layer and removing said remained mask units as set froth at column 3, lines 38, 51, 65 and 66. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have had form a second metal layer

al. in order to emit the current in much higher magnitude.

Regarding claim 10, the modified Zhang discloses the process according to claim 9, wherein said substrate is made of a material selected from a group consisting of plastic, quartz and glass (Zhang at col. 6, line 48).

Regarding claim 11, the modified Zhang discloses the process according to claim 9, wherein said first metal layer and said second metal layer are selected from a group consisting of aluminum layer, tungsten layer, tantalum layer, molybdenum layer, molybdenum-tungsten alloy layer and molybdenum-tantalum alloy layer (Cheng et al. at col. 4, lines 6-10).

Regarding claim 12, the modified Zhang discloses the process according to claim 11, wherein said first metal layer is formed on said substrate by a method selected from a group consisting of electron gun evaporation, sputtering technique and heat coating technique (Cheng et al. at col. 3, lines 38-46).

Regarding claim 13, the modified Zhang discloses the process according to claim 11, wherein said second metal layer (32 in fig. 3 of Cheng et al.) is formed on said metal oxide layer by a method selected from a group consisting of electron gun evaporation, sputtering technique and heat coating technique (Cheng et al. at col. 3, lines 36-48).

Regarding claim 14, the modified Zhang discloses the process according to claim 9, wherein said step (b) is performed by a photolithography technique and an etching method (Cheng et al. at col. 3, lines 32-33).

14, wherein said etching method is selected from reactive ion etching method and wet etching method (Cheng et al. at col. 3, lines 34-35).

Regarding claim 16, Zhang discloses a process of forming a field emission electrode for manufacturing a field emission array (col. 1, lines 15-21), comprising steps of: (a) providing a substrate (20 in figs. 4a-f) having a first metal layer (col. 3, lines

14,17) thereon; (b) forming a photoresist layer (22) on said first metal layer; (c) partially removing said first metal layer uncovered by the remained photoresist layer (col. 7, lines 25-28); (d) oxidizing a surface of the remained first metal layer by an anodic oxidization method for forming a metal oxide layer thereon such that an upper portion of the unoxidized remained first metal layer is in the shape of plural chimneys (col. 6, lines 53-57; figs. 4a-f); **but Zhang does not disclose** the following steps: (e) forming a second metal layer on said metal oxide layer; and (f) removing said remained photoresist layer. Cheng et al. teach that it is known in the art to form a second metal layer on a metal oxide layer and removing said remained photoresist layer as set froth at column 3, lines 38, 51, 65 and 66. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have had form a second metal layer on said metal oxide layer and remove said remained photoresist layer, as taught by Cheng et al. in order to emit the current in much higher magnitude.

Regarding claim 17, the modified Zhang discloses the process according to claim 16, wherein said first metal layer and said second metal layer are selected from a group consisting of aluminum layer, tungsten layer, tantalum layer, molybdenum layer,

. . .

col. 4, lines 6-10).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ageno et al. (US 5,449,435) disclose a field emission device.

Sin et al. (US 5,982,081) disclose a field emission device. Takada (US 5,739,628) discloses a field emission device. Cheng et al. (US 5,643,032) disclose a method of fabricating a field emission device. Hoeberechts (US 4,095,133) disclose a field emission device. Lee et al. (US 6,326,221 B1) disclose methods for manufacturing field emitters arrays. Takemura (US 5,666,020) discloses a field emission device. Wilson (US 6,461,526 B1) discloses a method for forming uniform sharp tips. Yuito et al. (US 4,008,412) disclose a thin-film field-emission electron source. Allen (US 5,818,153) discloses a self-aligned gate field emitter device. Alwan (US 6,080,032) discloses a process for low temperature semiconductor fabrication. Blalock et al. (US 6,387,717 B1) disclose field emission tips. Lee et al. (US 5,481,156) disclose a field emission cathode. Cathey (US 6,049,089) discloses electron emitters. Derraa (US 6,498,425 B1) discloses a field emission device. Lee (US 5,401,676) discloses a method for making a silicon field emission device. Forbes et al. (US 6,232,705 B1) disclose field emitter arrays.

Any inquiry concerning this communication or earlier communications from the

1071. The examiner can normally be reached on M-F (7:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dean A Reichard can be reached on (703) 308-3682. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

305-3431 for regular communications and (703) 305-1341 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

AN
March 12, 2003

Dean A. Reichard 3/12/03
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